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AUTHOR	Tanner, David E.
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ABSTRACT

One dimension of the current educational reform movement made testing teacher candidates a fixture in nearly every state. The companion problem is that standardized test scores often correlate with the test-taker's ethnicity and gender. Such an outcome appears to place teacher competency interests in competition with egalitarian interests. Is equity of access sacrificed to the aptitude of teacher candidates? The results of this study indicate that standardized tests need not have an inordinate impact on the ethnicity and gender of those who wish to teach. Data were collected from teacher candidates who took the California Basic Education Skills Test (CBEST) at one university in December 1997. Results from a study of several hundred candidates in central California indicate that while those variables are statistically significant predictors of teacher candidates' scores, they explain comparatively little of scoring variability. (Contains 1 figure, 3 tables, and 17 references.) (Author/SLD)

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What has Teacher Competency Testing Wrought?

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David E. Tanner, PhD

California State University, Fresno

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Abstract

One dimension of the current educational reform movement made testing teacher candidates a fixture in nearly every state. The companion problem is that standardized test scores often correlate with the test-taker's ethnicity and gender. Such an outcome appears to place teacher competency interests in competition with egalitarian interests. Is equity of access sacrificed to the aptitude of teacher candidates? The results of this study indicate that standardized tests need not have an inordinate impact on the ethnicity and gender of those who wish to teach. Results from a study of several hundred candidates in Central California indicate that while those variables are statistically significant predictors of teacher candidates' scores, they explain comparatively little of scoring variability.

Educational reform movements in this country tend to occur in a predictable cycle. Some event exposes an educational deficit after which a period of debate helps shape the nature of the prescription. With Sputnik, for example, critics traced the shortfall to inadequate math and science training and improvement in those curricular areas became a reform focal point.

The publication of "A Nation at Risk" (National Commission, 1983) fueled a reform movement that remains in process, but with at least two differences from the post-Sputnik era. First, rather than isolating a particular discipline or subject, there were concerns about the general performance of elementary and secondary school students, an emphasis punctuated by periodic, and uniformly discouraging, international comparisons (National Institute, 1998). Second, rather than being content to manipulate funding, legislative bodies promoted teacher testing (Rudner, 1988) and implied in so doing that teacher quality was a causal factor in poor student performance. The testing reflected a more general suspicion that teacher candidates were among the *least* academically talented of university populations (Applegate, 1987; Galluzo and Arends, 1989; Nelli, 1984; Savage, 1983; Weaver, 1981).

The relationship between specific teaching behaviors and student performance is not a tenuous connection in the scholarly literature. Bloom (1984) analyzed multiple educational variables and documented effects ranging to 2.00 standard deviations for specific teacher-controlled variables on student performance. Although the connection between the teachers' *academic qualifications* and students' performance is less clear, using standardized tests to gauge teachers' academic competency has become policy in most states nevertheless (Rudner, 1988).

The tests have a well-documented collateral effect. Scores consistently correlate with ethnic, and sometimes gender group membership (Applegate, 1987; Crouse and Trusheim, 1988; Hawkins, 1993; Marsh, 1989). Consequently, although the tests provide an avenue to gauging teachers' levels of basic literacy, they also raise the possibility that the desire that all groups have equitable access to teaching, is a competitive objective.

Since passing the California Basic Educational Skills Test (CBEST) became a prerequisite to receiving the credential, the related debate in California has been protracted and sometimes emotional. A legal challenge was decided in 1996 in favor of the body responsible for teacher credentialing (The Association of Mexican American Educators, et al., v. the State of California, 1996). Although the evidence for group scoring differences was unequivocal (Bruno and Marcoulides, 1985; Watkins, 1985), in the view of the court, the test was only the messenger.

In spite of the public discussion and the early studies (Bruno and Marcoulides, 1985; Watkins, 1985), little published literature investigates the relationship between ethnicity, gender, and CBEST scores beyond a superficial level. There is little to indicate the magnitude of the effect that ethnicity and gender on CBEST scoring, for example. On a more fundamental level, the question of the possible effect a test has on candidates' academic qualifications remains largely unanswered. Given the test's potential impact, two questions seem timely:

1) What proportion of CBEST performance can be attributed to students' ethnicity and gender?
2) What evidence is there that the competency test has had an impact on the teacher candidates' academic qualifications?

Method

The testing agency offers CBEST several times each year at multiple university sites throughout California after which the agency forwards the scores to the respective institution. Administrative records at each site provide the relevant ethnic group membership and gender information, as well as other measures of student performance including academic aptitude data.

Subjects

At a central California university, scoring data were collected for all tested at the site in December, 1997. University records indicated each candidate's ethnic group membership and gender. Students who attended the university before completing two years elsewhere must also submit their Scholastic Assessment Test (SAT) scores and a subset of the total group who took CBEST also had SAT scores registered with the university.

Instrumentation

The CBEST includes three subtests in the areas of reading, math, and writing. The competencies involved are typical of those required of secondary school students. The math test, for example, requires nothing beyond the level of introductory algebra and geometry. The reading and math items employ information provided in the test materials. The writing portion involves two topics, neither of which requires "specialized knowledge in [one's] responses" (CBEST, 1999-2000, p. 33).

While the SAT attracts its share of criticism (see Crouse and Trusheim, 1988, for

example), it remains the most widely employed measure of academic aptitude for the college bound. For that subset of the total group who had them, SAT scores were used to indicate candidates' general academic aptitude.

Analysis

When ethnicity and gender are the independent variables in multiple regression analysis, with CBEST score the dependent variable, the square of the multiple R statistic indicates how much of the variability in CBEST scoring gender and ethnicity explain. Further, one can reduce that value to the proportions due to each of ethnicity and gender by squaring the respective partial correlations.

The CBEST scores reflect basic reading, math, and writing competency. The SAT, on the other hand, provides measures of general verbal and mathematical aptitude. Indeed, the rationale for the test is the predictive validity SAT scores hold for post secondary study. With SAT scores employed as an indicator of general verbal and mathematical aptitude, one can compare the performance of those who pass CBEST to the performance of those who do not. The product is one measure of the impact that CBEST has on teacher candidates' academic ability, which is the substance of the second research question.

Results

A relatively small number of subjects (approximately 5% of the total) took the test at the site, but were not enrolled and are not part of this analysis. Those enrolled at the university numbered 552. Of that group, SAT data were available for 286, or about

52%.

CBEST and demographic variables

Among the subjects, regression analysis (Table 1) indicates that both ethnicity and gender are statistically significant predictors of reading and math CBEST scores. Ethnicity , but not gender is also a statistically significant predictor of writing scores.

Place Table 1 About Here

Although they are better-than-chance predictors of CBEST outcomes, the R^2 values indicate that these demographic characteristics explain comparatively little of the variability in test scores. In Table 2, variability in scoring is reduced to that portion due to ethnicity and that related to the candidate's gender. Ethnic group membership explains less than 8% of the variance in writing scores (Table 2). Proportions diminish from that level.

Place Table 2 About Here

The Impact of CBEST on Academic Aptitude

For Hispanic, Southeast Asian, and Caucasian students, the SAT indicates significant differences between the scores of those passed CBEST and those who did not (Table 3). The differences were not significant for African American students, but must

be qualified because of small sample size. The relevant statistics were not computed for Asian students, because of small sample size.

Place Table 3 About Here

Discussion

One of the elements distinguishing the current round of educational reform is the charge that poor student performance reflects low levels of ability among teachers. Whatever the veracity of the charge, teacher testing has become a fixture. This study was prepared to respond to two of the related issues: to what degree are ethnicity and gender factors in teacher candidates' test scores, and what impact has a competency screening test had on the teachers' academic aptitude?

Any statistically significant correlation between the candidates' ethnicity or gender and their test scores begs questions about the origin of the differences. Without wishing to minimize the importance of that investigation, it is clear that in this instance at least, the proportion of CBEST scoring related to the candidates' ethnicity and gender is quite minimal. While statistically significant in most cases, it is relatively unimportant as a practical matter ranging from less than 8% of variability in scoring explained, downward.

The comparatively lenient test administration policies may have minimized the impact that demographic characteristics have on CBEST scores. Candidates may repeat the test as many times as they wish with no sliding cut-off score (and no adjustment for increasing type I error). Furthermore, high scores on one test can compensate, in some

measure, if scores on one of the others fall below the minimum standard. Whether tightening up standards would exacerbate ethnic group and gender differences is a question for further study.

These issues aside, it appears that the competency test is having the desired effect. When SAT scores are the indicator, the aptitude for most groups who pass CBEST is significantly higher than for those who fail. The lack of statistical significance for African American candidates may be an artifact of sample size. To the degree that teachers' academic ability correlates with students' achievement, an assumption not well documented in the scholarly literature, a reading, math, and writing test appears to be an effective reform mechanism. In this instance at least, standardized testing for teacher candidates has helped select candidates with relatively higher levels of academic aptitude, and has done so with only minimal impact on the ethnicity and gender of the teaching force.

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Figure 1
The Relationship Between Gender, Ethnicity, and CBEST Scores

Reading	Unstandardized Coeff.		Stand Coeff	t	Sig.	Model R^2
	B	Std. Error				
Constant	36.029	1.356		26.566	.000	.079
Ethnicity	2.108	.320	.272	6.589	.000	
Gender	2.291	1.139	.083	2.011	.045	

Math	Unstandardized Coeff.		Stand Coeff	t	Sig.	Model R^2
	B	Std. Error				
Constant	35.739	1.354		26.396	.000	.105
Ethnicity	1.902	.320	.242	5.945	.000	
Gender	6.198	1.123	.225	5.517	.000	

Writing	Unstandardized Coeff.		Stand Coeff	t	Sig.	Model R^2
	B	Std. Error				
Constant	36.249	1.005		36.058	.000	.081
Ethnicity	1.567	.237	.278	6.625	.000	
Gender	-1.057	.845	-.053	-1.251	.212	

Table 2
The Proportion of Variability in CBEST Scores Explained ($r^2_{y,1.2}$) by Gender and Ethnicity

Sub-Test	Variance Explained	
	Ethnicity	Gender
Reading	.072	.007
Math	.055	.051
Writing	.078	.003

Table 3

The Average SAT Scores of Those Who Pass

CBEST,Compared to the Scores of those Who Did Not:

a) Means by Group, and b) Significance Tests

a)

Ethnic Group	Pass CBEST		Fail CBEST	
	SATV	SATM	SATV	SATM
Af. Amer.	445	445	408	370
Hisp. Amer.	458	479	358	356
Asian Amer.	450	560	440	452
SE Asian Amer.	431	460	326	411
Caucasian Amer.	484	486	392	408

b)

Group		Mean Diff.	df	Std Err Diff	t value	Sig.
SATV	African Am	37.5	18	37.441	1.002	NS
	Hispanic Am	99.55	190	13.391	1.416	<.01
	Asian Am	10	13		*	
	SE As. Am	105.55	57	31.09	3.395	<.01
	Caucas. Am	91.54	199	13.01	7.036	<.01
SATM	African Am	75	18	52.951	1.416	NS
	Hispanic Am	122.58	190	12.939	9.474	<.01
	Asian Am	108	13		*	
	SE As. Am	49.44	57	23.111	2.139	<.05
	Caucas. Am	78.19	199	11.601	6.74	<.01

Note: NS = not significant
* indicates not calculated because of small n

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